

TREATMENT OF ANEURYSMS OF THE ANTERIOR COMMUNICATING (ACC) ARTERY*

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THE diagnosis of a ruptured aneurysm of the anterior communicating (ACC) artery of the circle of Willis is often difficult, because the first evidence of its presence is usually an acute subarachnoid hemorrhage without any localizing neurological signs.¹ Consequently, this condition is often overlooked until too late, because intracranial hemorrhage of this sort, especially in a hypertensive patient, may simply be attributed to a vascular accident.

However, now that prompt bilateral cerebral angiography has proved such a safe and effective diagnostic procedure, fewer of these dangerous lesions are being overlooked.

A recent review of good risk patients with such lesions has shown that, without surgical treatment of their aneurysm, close to 75 per cent die of a recurrent hemorrhage.² Even though induced hypotension is used in addition to bed rest and sedation, the mortality from further bleeding episodes is 33 per cent,³ although it can be less than this if the same type of patient and lesion is operated upon.

While carotid artery ligation or clamping in the neck can be effective in preventing further hemorrhages, it may also be ineffective, and can have an associated mortality of approximately 20 per cent⁴ and a morbidity, manifested by such complications as permanent hemiplegia or aphasia, of close to 18 per cent.⁵ For these reasons the therapeutic procedure of choice would seem to be direct treatment of the aneurysm intracranially. In this respect, however, several important considerations must be weighed, such as the selection of patients for surgery, the timing of all operations, and the type of surgical approach.

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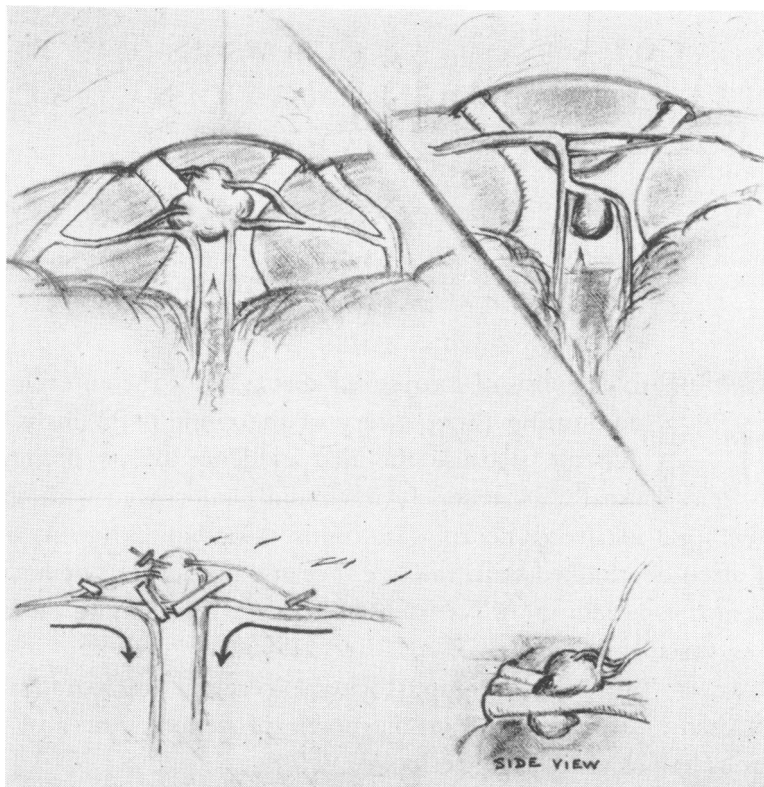


Figure 1. Difficult type of aneurysm of the anterior communicating (ACC) artery, above and straddling the optic chiasm.

Lower left: shows aneurysm clipped with preserved flow through both anterior cerebral (AC) arteries.

A recent review of more than 200 cases of ruptured ACC aneurysm treated by intracranial surgery by 20 capable neurosurgeons indicates that the age of the patient and the presence of vascular hypertension are not highly significant factors, although an age of over 50 years and documented hypertension of over 150/100 tend to increase postoperative morbidity and mortality rates. If the patient is alert rather than lethargic his chances are also somewhat better for a happy outcome following surgery. Comatose patients generally all die without surgery, whereas "salvage" surgery has saved the lives of a few such cases.

Experience, together with data from this recent survey, has shown that the surgical mortality rate is higher if operation is done within the

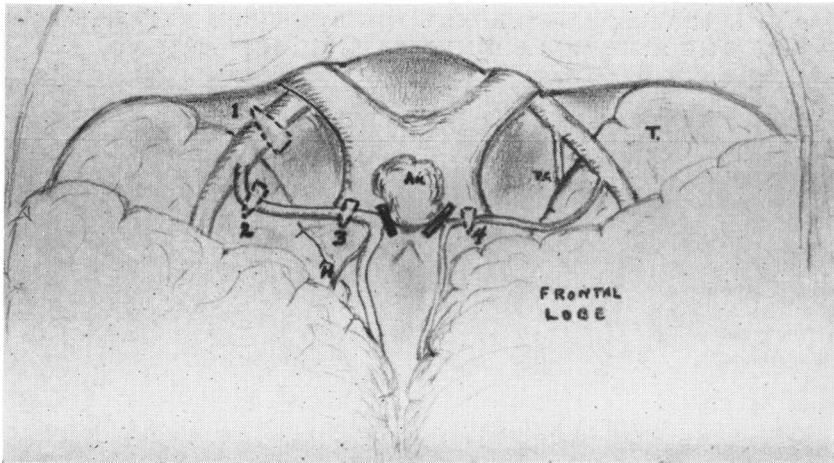


Figure 2. Shows aneurysm of the anterior communicating (ACC) artery permanently clipped. Dotted lines show position of temporary clip on: (1) left internal carotid artery until placement at (2) on left anterior cerebral artery proximally and then replaced at (3) closer to aneurysm at (4) temporary clip on right anterior cerebral artery. (No clip shown on right internal carotid.)

T = temporal lobe. P. C. = posterior communicating artery.

first 6 days after a subarachnoid hemorrhage, and is appreciably lower if operation is done from the 7th to the 10th day. Moreover, a few cases in excellent condition have died of a sudden recurrent hemorrhage because operation was delayed beyond the 10th day. For these reasons the optimal time for intracranial surgery on this type of aneurysm would seem to be between the 6th and 10th day after the presenting episode of subarachnoid hemorrhage. Such patients will presumably then be in better condition with respect to their intracranial circulatory status, and yet will not run any great risk of dying before surgical intervention can be offered. While it is true that the longer surgery is postponed the less are the risks of a poor result, lives may be lost by too great a delay.

As to the type of surgery, the recent survey of over 200 cases of ruptured ACC aneurysms treated by intracranial surgery shows the following mortality rates for favorable risk patients: Clip occlusion of the aneurysm, 16.4 per cent; proximal occlusion of one anterior cerebral (AC) artery only, 20 per cent; muscle wrapping of the aneurysm sac, 21.7 per cent; multiple clipping of anterior cerebral vessels, 40 per cent;

TABLE I—INTRACRANIAL SURGERY FOR RUPTURED ANEURYSMS OF THE ANTERIOR COMMUNICATING (ACC) ARTERY

<i>Procedure</i>	<i>Morbidity</i>	<i>Mortality</i>	<i>Total</i>
Clip Aneurysms			
T.C. clip method	20%	6.5%	26.5%
Proximal AC Occlusion	9%	20 %	29 %
Muscle Wrapping	13%	21 %	34 %
Clip Aneurysm			
All methods	19%	16 %	35 %
Multiple AC Clips	22%	40 %	62 %
Multiple Aneurysms	16%	50 %	66 %

multiple aneurysms, 50 per cent. Proximal AC occlusion and muscle wrapping of the aneurysm may not prevent subsequent fatalities due to recurrent hemorrhage. Clipping the aneurysm therefore seems preferable, especially as the mortality rate has now been reduced (for favorable risk patients) to 6.5 per cent, provided a bifrontal craniotomy flap is used to facilitate exposure, and temporary clips are applied to *both* anterior cerebral arteries to prevent premature rupture of the aneurysm at operation until it is clipped. Hypothermia and intravenous urea have helped reduce the surgical mortality for noncomatose patients, mostly operated upon within 6 to 14 days after hemorrhage, to 6.5 per cent.¹ Morbidity and mortality figures for the various forms of treatment of anterior communicating (ACC) artery aneurysms are given in Table I.

DISCUSSION

The figures reported herein are quite similar to those cited by McKissock, Paine and Walsh,⁴ with respect to both unoperated and operated patients with this type of lesion as to mortality, and also as to the incidence of recurrent hemorrhages. Fisher,⁶ moreover, has also referred to the peak incidence of recurrent hemorrhage in unoperated patients as occurring in the second week after their presenting episode of subarachnoid hemorrhage. Therefore, if surgery is to be undertaken

it would seem wise to proceed, in favorable risk but not comatose patients, between the 6th and 10th day after the presenting hemorrhage, especially for those patients under 60 years of age who are not severely hypertensive.

The procedure of choice would seem to be direct clip occlusion of the aneurysm.¹ If this cannot be done safely because of the condition of the patient or a brittle, arteriosclerotic aneurysmal sac, the sac may then be wrapped with a muscle stamp to promote surrounding fibrosis, or one anterior cerebral (AC) artery may be ligated proximally (provided the other, although smaller, is functioning).

Multiple clipping of the anterior cerebral artery system had best be avoided, as this can lead to crippling or fatal circulatory insufficiency due to serious cerebral infarction.

If more than one aneurysm is present the case should be managed either without surgery or by treating both aneurysms intracranially, preferably at the same operative procedure. Otherwise the second aneurysm (usually arising from the internal carotid or posterior communicating artery) may rupture fatally, as indicated by the percentage of poor results listed in Table I for such cases, unless both aneurysms are properly treated. Every effort should be made, of course, to determine which aneurysm has bled by searching for angiographic evidence of the local cerebral vasospasm that is usually present near a recently ruptured aneurysm.⁷

Additional data now being collected will undoubtedly clarify many of these points still farther.

CONCLUSIONS

1. Subarachnoid hemorrhage without localizing neurological symptoms or signs is characteristic of rupture of an aneurysm of the anterior communicating (ACC) artery.
2. Prompt cerebral angiography, bilaterally, is advisable for such patients.
3. Ruptured ACC aneurysms, if not treated surgically, sooner or later are apt to bleed again, usually fatally.
4. Surgical intervention, therefore, seems the procedure of choice for treating such aneurysms. While various techniques are discussed,

one of the most satisfactory methods is direct clip occlusion of the aneurysm, preferably with the aid of temporary clips, under hypothermia and after the administration of intravenous urea.

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